

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



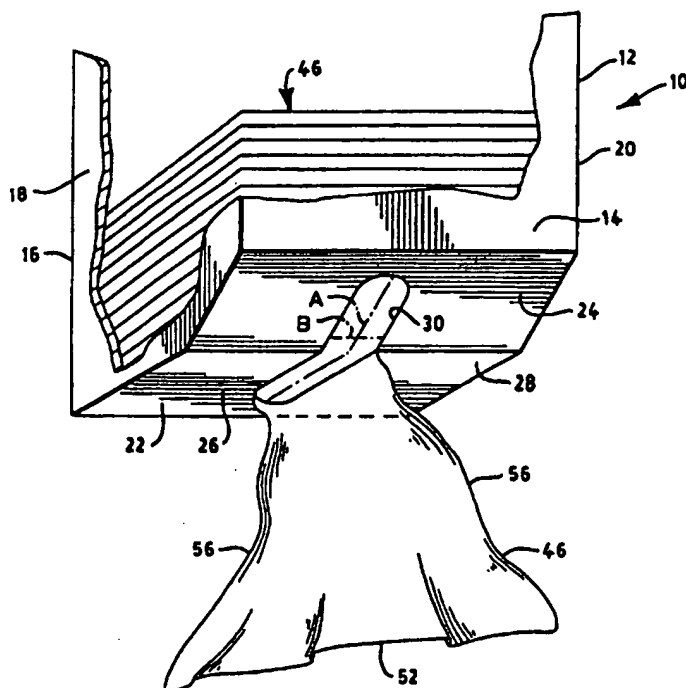
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|   |  |  |  |
|---|--|--|--|
| (51) International Patent Classification <sup>6</sup> :<br><b>A47K 10/42</b>                                  |  | A1   | (11) International Publication Number: <b>WO 97/43938</b>        |
|   |  |  | (43) International Publication Date: 27 November 1997 (27.11.97) |
| (21) International Application Number: PCT/GB97/01362   |  | (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). |  |
| (22) International Filing Date: 20 May 1997 (20.05.97)  |  |  |  |
| (30) Priority Data:<br>08/650,725 20 May 1996 (20.05.96) US   |  |  |  |
| (71) Applicant: KIMBERLY-CLARK LIMITED [GB/GB];<br>Northop, Mold, Clwyd CH7 6WA (GB).                         |  |  |  |
| (72) Inventor: KING, Timothy, James; Rose Cottage, Off Francis Road, Moss, Near Wrexham, Clwyd LL11 6EM (GB). |  |  |  |
| (74) Agent: FRANK B. DEHN & CO.; 179 Queen Victoria Street, London EC4V 4EL (GB).                             |  | Published<br>With international search report.   |  |

(54) Title: FOLDED SHEET DISPENSER

(57) Abstract

A dispenser (10) for individually dispensing sheets of material from a column (42) of sheets of material formed by a plurality of vertically stacked, folded sheets of material (46) is provided. The dispenser (10) is sized for receiving a plurality of vertically stacked, folded sheets of material (46) and includes a bottom surface (22), a forward wall (14) and a rear wall. The forward wall (14) and the rear wall are separated by spaced-apart side walls (18, 20). The bottom surface (22) defines a discharge opening (30) having a length dimension (A) greater than a width dimension (B). The discharge opening (30) is orientated such that the length dimension (A) is generally in a transverse orientation with respect to the orientation of the forward wall (14). The plurality of vertically stacked, folded sheets of material (46) within the housing are supported by the bottom surface (22). Each sheet (46) includes a leading edge (52) and a trailing edge separated by spaced-apart side edges (56). In the process of dispensing individual sheets from the dispenser (10), the side edges (56) of the sheets are urged inwardly by the width dimension (B) of the discharge opening as individual sheets pass through the opening (30).



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

|    |                          |    |  |    |  |    |                          |
|----|--------------------------|----|--|----|--|----|--------------------------|
| AL | Albania                  | ES | Spain                                    | LS | Lesotho                                      | SI | Slovenia                 |
| AM | Armenia                  | FI | Finland                                  | LT | Lithuania                                    | SK | Slovakia                 |
| AT | Austria                  | FR | France                                   | LU | Luxembourg                                   | SN | Senegal                  |
| AU | Australia                | GA | Gabon                                    | LV | Latvia                                       | SZ | Swaziland                |
| AZ | Azerbaijan               | GB | United Kingdom                           | MC | Monaco                                       | TD | Chad                     |
| BA | Bosnia and Herzegovina   | GE | Georgia                                  | MD | Republic of Moldova                          | TG | Togo                     |
| BB | Barbados                 | GH | Ghana                                    | MG | Madagascar                                   | TJ | Tajikistan               |
| BE | Belgium                  | GN | Guinea                                   | MK | The former Yugoslav<br>Republic of Macedonia | TM | Turkmenistan             |
| BF | Burkina Faso             | GR | Greece                                   | ML | Mali   | TR | Turkey                   |
| BG | Bulgaria                 | HU | Hungary                                  | MN | Mongolia                                     | TT | Trinidad and Tobago      |
| BJ | Benin                    | IE | Ireland                                  | MR | Mauritania                                   | UA | Ukraine                  |
| BR | Brazil                   | IL | Israel                                   | MW | Malawi                                       | UG | Uganda                   |
| BY | Belarus                  | IS | Iceland                                  | MX | Mexico                                       | US | United States of America |
| CA | Canada                   | IT | Italy                                    | NE | Niger  | UZ | Uzbekistan               |
| CF | Central African Republic | JP | Japan                                    | NL | Netherlands                                  | VN | Viet Nam                 |
| CG | Congo                    | KE | Kenya                                    | NO | Norway                                       | YU | Yugoslavia               |
| CH | Switzerland              | KG | Kyrgyzstan                               | NZ | New Zealand                                  | ZW | Zimbabwe                 |
| CI | Côte d'Ivoire            | KP | Democratic People's<br>Republic of Korea | PL | Poland                                       |    |                          |
| CM | Cameroon                 | KR | Republic of Korea                        | PT | Portugal                                     |    |                          |
| CN | China                    | KZ | Kazakhstan                               | RO | Romania                                      |    |                          |
| CU | Cuba                     | LC | Saint Lucia                              | RU | Russian Federation                           |    |                          |
| CZ | Czech Republic           | LI | Liechtenstein                            | SD | Sudan  |    |                          |
| DE | Germany                  | LK | Sri Lanka                                | SE | Sweden                                       |    |                          |
| DK | Denmark                  | LR | Liberia                                  | SG | Singapore                                    |    |                          |
| EE | Estonia                  |    |  |    |  |    |                          |

- 1 -

FOLDED SHEET DISPENSER

5       The present invention is directed to folded sheet  
dispensers. Particularly, the present invention is  
directed to bottom discharge sheet dispensers for  
dispensing folded tissue sheets, paper towels sheets or  
the like. More particularly, the present invention is  
directed to bottom discharge sheet dispensers for  
10       dispensing interleaved bath tissue sheets.

      The present invention provides a dispenser having a  
bottom surface defining an opening, such as a discharge  
opening. The opening has a length dimension which is  
greater than the opening's width dimension. The opening  
15       is adapted such that web material, such as a sheet of  
tissue or paper towel, passing through the opening is  
narrowed by the width dimension of the opening.

      In one embodiment, the dispenser may include a  
forward wall and a rear wall connected by spaced-apart  
20       side walls. The rear wall may be adapted for securing  
the dispenser to a support. In this embodiment, the  
length dimension of the opening may generally be in a  
transverse orientation with respect to the orientation  
of the forward wall and desirably, the length dimension  
25       of the opening may be generally perpendicular to the  
forward wall. Generally, the shape of the opening may be  
characterized as rod-shaped, oval, star, dumbbell,  
clover, elliptical, keyhole-shaped, and/or oblong. The  
shape of the opening may be characterized by other  
30       shapes so long as the width dimension is configured to  
narrow a sheet of material passing therethrough.

      The material dispensed by the dispenser may be a  
plurality of vertically stacked, folded sheets. Each  
sheet may include a leading edge and a trailing edge  
35       spaced-apart by side edges connected to the leading and  
trailing edges. During the process of dispensing such  
material, and particularly such folded sheets from the  
dispenser, the side edges of the folded sheets are urged

- 2 -

inwardly towards each other, or are converged by the width dimension of the discharge opening as said sheets pass through the discharge opening. In this way, it may be said that the sheets are "narrowed" by the width dimension of the discharge opening as the sheets pass through or traverse the discharge opening.

In another embodiment of the present invention, a dispenser for dispensing individual sheets from a plurality of vertically stacked, folded sheets is provided. The dispenser includes a housing sized for receiving a plurality of vertically stacked, folded sheets. The housing includes a bottom surface, a vertically oriented forward wall and a vertically orientated rear wall separated by spaced-apart vertically orientated side walls which are connected to the bottom surface, the forward wall and the rear wall. The bottom surface defines a sheet discharge opening having a length dimension greater than its width dimension. The length dimension is generally in a transverse orientation with respect to the orientation of the forward wall. A plurality of vertically stacked, folded sheets and desirably, a plurality of vertically stacked interleaved sheets, are provided within the housing and supported by the bottom surface. Each sheet includes a leading edge and a trailing edge separated by spaced-apart side edges. The side edges of each sheet are urged inwardly by the width dimension of the discharge opening as the sheets are discharged from the dispenser through the discharge opening. Generally, the shape of the discharge opening may be characterized as rod-shaped, oval, star, dumbbell, clover, elliptical, keyhole-shaped and/or oblong.

Embodiments of the invention will now be described by way of example only and with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a dispenser with certain portions cut away;

FIG. 1A is a cross-sectional view of FIG. 1 through

- 3 -

lines 1-1;

FIG. 2 is a perspective view of another embodiment of a dispenser;

5       FIG. 2A is a cross sectional view of FIG. 2 through lines 2-2;

FIGS. 3A-E illustrate various discharge opening shapes;

10       FIGS. 4A-B is a schematic cross section of a dispenser illustrating a dispensing sequence for a plurality of vertically stacked, interleaved sheets; and

FIG. 5 is a fragmented, enlarged, perspective view of the dispenser of FIG. 1 illustrating the dispenser in use with a plurality of vertically stacked sheets supported within the dispenser.

15

Referring now to FIG. 1, a bottom discharge tissue or paper towel dispenser 10 is illustrated. The dispenser 10 includes a housing 12 sized for receiving a dispensable material, and desirably a plurality of  
20       folded sheets and more desirably a plurality of vertically stacked, interleaved sheets (see FIGS. 4A and 4B).

The housing 12 includes a forward wall 14, a rear wall 16 and two side walls 18 and 20. Desirably, the  
25       forward wall 14 and the rear wall 16 are vertically orientated and are separated by the spaced-apart vertically orientated side walls 18 and 20. The rear wall 16 is desirably configured to be secured to a support surface (FIGS. 4A and 4B), such as a wall, in a  
30       conventional manner, such as by bolting, gluing, nailing, brackets, screwing, etc. In this way, the forward wall 14 of the dispenser 10 is nearest an individual (not shown) in facing relationship to the forward wall 14.

35       In one embodiment, the housing 12 further includes a bottom surface 22. Desirably, the bottom surface 22 is "bi-planar". That is, the bottom surface 22 is formed by two surfaces, 24 and 26, which intersect along an

- 4 -

edge 28 at an angle which is either greater than or less than 180°. The surfaces 24 and 26 may be planar or curvilinear.

The bottom surface 22 further includes portions  
5 defining a discharge opening 30. The discharge opening 30 has a length dimension, illustrated by broken line A, and a width dimension B, illustrated by broken line B. The width dimension B is generally in a parallel orientation with respect to the orientation of either  
10 the rear wall 16 or the forward wall 14 and generally in a transverse or perpendicular orientation with respect to the orientation of one of the side walls, 18 or 20. The length dimension A is generally in a transverse or perpendicular orientation with respect to the  
15 orientation of either the rear wall 16 or the forward wall 14 and generally in parallel orientation with respect to the orientation of one or both of the side walls, 18 or 20. This orientation of the opening 30 with respect to the bottom surface 22 may also be referred to  
20 as "front-to-back", i.e., wherein the length dimension A, longer of the two dimensions, A and B, is oriented in a direction from the forward wall 14 to the rear wall 16.

FIG. 1A is a portion of the dispenser 10 in cross  
25 section and more clearly illustrates the position of opening 30 with respect to the bottom surface 22, and particularly with respect to the surfaces 24 and 26.

FIG. 2 illustrates a dispenser 10A which is  
substantially similar to the dispenser 10, except that  
30 the opening 30 is defined solely by the dimension of the surface 24 of the bottom surface 22.

FIG. 2A is a portion of the dispenser 10A in cross  
section and more clearly illustrates the position of  
opening 30 with respect to the bottom surface 22 and  
35 particularly with respect to the surfaces 24 and 26.

FIGS. 3A-E illustrate several examples of the shape of the discharge opening 30. The respective length dimensions of each shape in FIGS. 3A-E are illustrated

- 5 -

by broken line A. The respective width dimensions of each shape in FIGS. 3A-E are illustrated by broken line B.

5 In some instances, for example in FIGS. 3C and 3D, broken line B1 and B2 illustrate separate width dimensions of varying size within each of the respective shapes. However, in these instances, the length dimension A remains greater than the larger of either width dimension B1 or B2.

10 The shape of the discharge opening 30 illustrated in FIGS. 1 and 2 may be characterized as "rod-shaped". Referring now to FIG 3A, shape 32 may be characterized as "star-shaped". Shape 34 of the discharge opening 30 illustrated in FIG. 3B may be characterized as "clover-shaped".  
15 Shape 36 of the discharge opening 30 illustrated in FIG. 3C may be characterized as "dumbbell-shaped". Shape 38 of the discharge opening 30 illustrated in FIG. 3D may be characterized as "keyhole-shaped". Shape 40 of the discharge opening 30  
20 illustrated in FIG. 3E may be characterized as "oval-shaped".

Referring now to FIGS. 4A and 4B, two columns 42 and 44, each containing a plurality of vertically stacked folded sheets 46 and particularly a plurality of  
25 vertically stacked interleaved sheets, are illustrated. More particularly, within each column 42 and 44, each sheet 46 is generally folded in half upon itself such that the folded halves capture the trailing edge 54 of the sheet directly below it and the leading edge 52 of  
30 the sheet directly above it. Each column, 42 and 44, is supported within a dispenser 48 by the bottom surface 22. The dispenser 48 is similar to the dispensers 10 and 10A. For purposes of describing the folded sheet 46, only the forward wall 14, the rear wall 16, the bottom  
35 surface 22 and the discharge opening 30 of the dispenser 48 are illustrated. As previously mentioned, the dispenser 48 may be secured to a support surface 50, such as a wall, by securely attaching the rear wall 16

- 6 -

to the support surface 50.

The interleaved folding pattern illustrated in FIGS. 4A and 4B result in a "front-to-back" sheet dispensing sequence. In other words, referring to FIG. 4A, the portion of the sheet 46 extending through the opening 30 is nearer the forward wall 14 than the rear wall 16. As such, the sheet 46 in FIG. 4A is in the "front" stage of the front-to-back sequence. As the remaining portion of the sheet 46 extending through the opening 30 of the dispenser 48 (FIG. 4A) is removed, the leading edge 52 of the next sheet 46 extends through the opening 30 (FIG.4B). The portion of this sheet 46 extending through the opening 30 in FIG.4B is nearer the rear wall 16 than the forward wall 14. As such, the sheet 46 in FIG.4B is in the "back" stage of the front-to-back sequence.

Referring now to FIG.5, the dispenser 10 is illustrated in dispensing operation. Portions of the side wall 18 and forward wall 14 are removed so that the column 42 containing the plurality of vertically stacked, folded sheets 46 positioned within the housing 12 of dispenser 10 may be illustrated. The plurality of vertically stacked, folded sheets 46 are supported by the bottom surface 22.

As previously described, the length dimension, illustrated by broken line A, of the discharge opening 30 is greater than the width dimension illustrated by broken line B. The orientation of the discharge opening 30 may be described by reference to the orientation of the length and/or width dimension thereof with respect to either the forward and/or rear walls, 14 and 16, respectively and/or the side walls 18 and/or 20. For example, as illustrated in FIG. 5, the length dimension A is generally in a transverse orientation, and desirably in a perpendicular orientation, with respect to the orientation of either the forward wall 14 or the rear wall 16 and generally in a parallel orientation with respect to the orientation of either side wall, 18



- 7 -

or 20. Another description of the orientation of the opening 30, for example, would be the width dimension B is generally in a transverse orientation, and desirably in a perpendicular orientation, with respect to the orientation of either side wall, 18 and/or 20 and is generally in a parallel orientation with respect to the orientation of either the forward wall 14 and/or the rear wall 16.

FIG.5 further illustrates a portion of one of the sheets 46 extending through the discharge opening 30. More particularly, the leading edge 52 of the sheet 46 extends below the opening 30 and a portion of each side edge 56 extends below the opening 30. In the process of dispensing sheets 46 from the dispenser 10, the side edges 56 of the sheets 46 are urged inwardly towards each other or are converged by the width dimension B of the opening 30 as said sheets pass through the opening 30. In this way, it may be said that the sheets 46 are "narrowed" by the width dimension B of the opening 30 as the sheets 46 pass through or traverse the opening 30. According to the invention, it is desirable that the stack of folded sheets 46 are configured such that the leading edges 52 extend across the opening 30 parallel to the width dimension B (i.e., perpendicular to the length dimension A).

While the invention has been described in detail with respect to specific embodiments thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing, may readily conceive of alterations to, variations of and equivalents to these embodiments.

- 8 -

Claims:

1. A dispenser comprising a bottom surface defining an opening having a length dimension greater than a width dimension, the opening adapted such that material passing through said opening is narrowed by the width dimension.

2. The dispenser of claim 1, further including a forward wall and a rear wall connected by spaced-apart side walls, wherein said rear wall is adapted for securing the dispenser to a support, and wherein the length dimension of the opening is generally in a transverse orientation with respect to the orientation of the forward wall.

3. The dispenser of claim 2, wherein the length dimension is substantially perpendicular to the forward wall.

4. A dispenser having a bottom surface for supporting a material adapted for dispensing through an opening defined by said bottom surface, wherein the opening has a length dimension greater than a width dimension, and wherein said opening is adapted such that material passing through said opening is narrowed by the width dimension.

5. The dispenser of claim 4, wherein the material includes a leading edge and a trailing edge spaced apart by side edges, and wherein the side edges of the material are urged inwardly by the width dimension as the material passes through the opening.

6. The dispenser of claim 4 or 5, wherein the material is further defined as a plurality of vertically stacked, interleaved sheets.

- 9 -

7. The dispenser of claim 4, 5 or 6, further including a forward wall and a rear wall connected by spaced-apart side walls, wherein said rear wall is adapted for securing the dispenser to a support, and  
5 wherein the length dimension of the opening is generally in a transverse orientation with respect to the orientation of the forward wall.

8. The dispenser of claim 7 wherein the length  
10 dimension is substantially perpendicular to the forward wall.

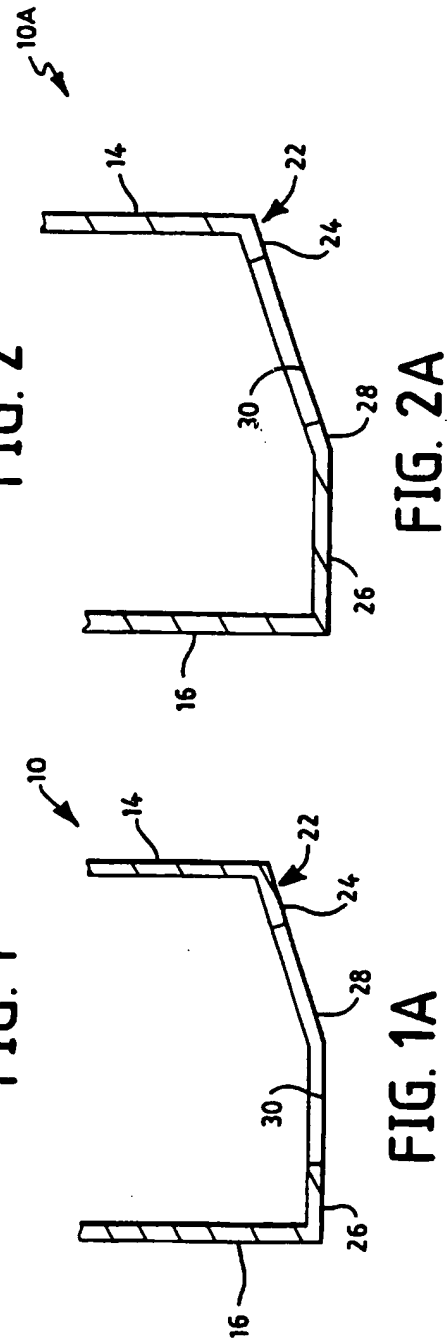
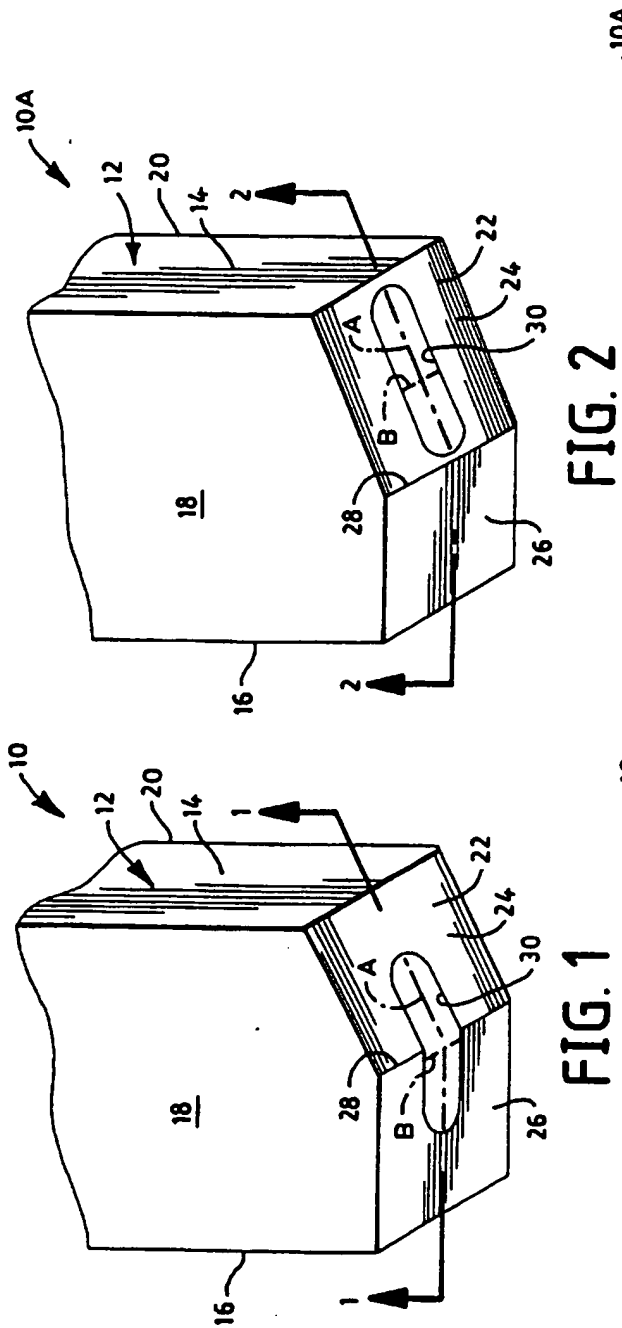
9. A dispenser for dispensing an plurality of vertically stacked, folded sheets comprising:  
15 a housing, sized for receiving a plurality of vertically stacked, interfolded sheets, having an bottom surface and a vertically oriented forward wall and a vertically orientated rear wall separated by spaced-apart vertically orientated side walls;  
20 wherein the bottom surface defines an opening having a length dimension greater than a width dimension, and wherein said length dimension is generally in a transverse orientation with respect to the orientation of the forward wall;  
25 a plurality of vertically stacked, folded sheets within the housing and supported by the bottom surface, wherein each sheet includes a leading edge and a trailing edge separated by spaced-apart side edges, and wherein the side edges of the sheets are urged  
30 inwardly by the width dimension of the opening as said sheets passing through the opening.

10. The dispenser of claim 9, wherein the length  
35 dimension is perpendicular to the forward wall.

11. The dispenser of claim 9 or 10, wherein the folded sheets are further characterized as interleaved sheets.

- 10 -

12. The dispenser of any preceding claim, wherein  
the shape of the opening is generally characterized by a  
shape selected from the group which includes rod-shaped,  
oval, star, dumbbell, clover, elliptical, keyhole-shaped  
5 or oblong.



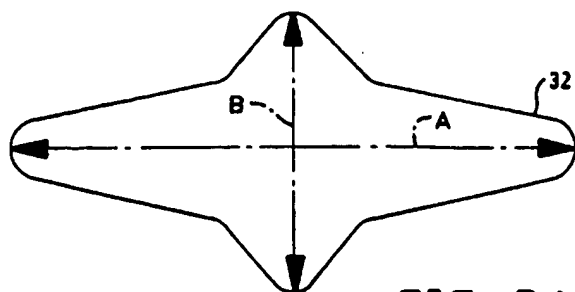


FIG. 3A

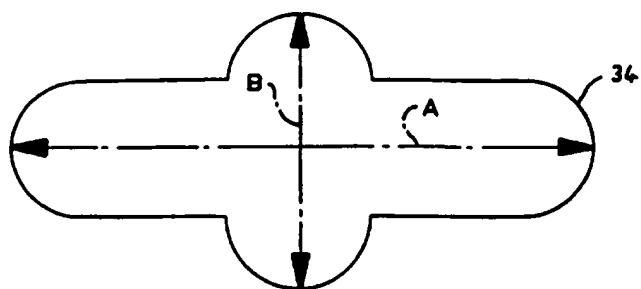


FIG. 3B

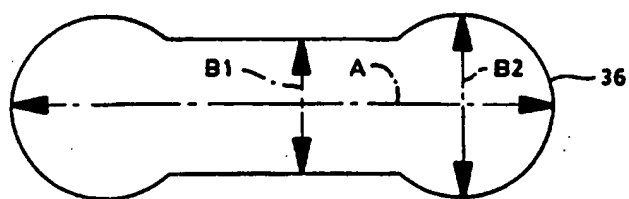


FIG. 3C

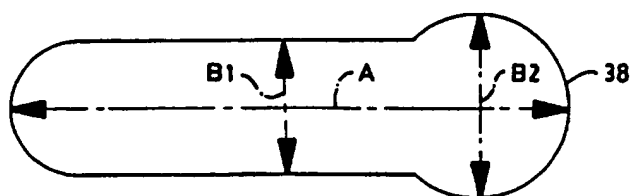


FIG. 3D

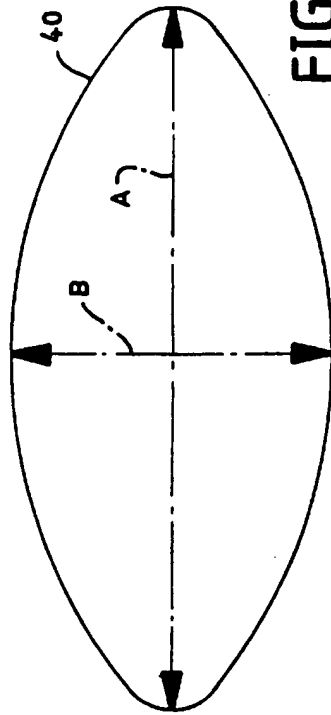


FIG. 3E

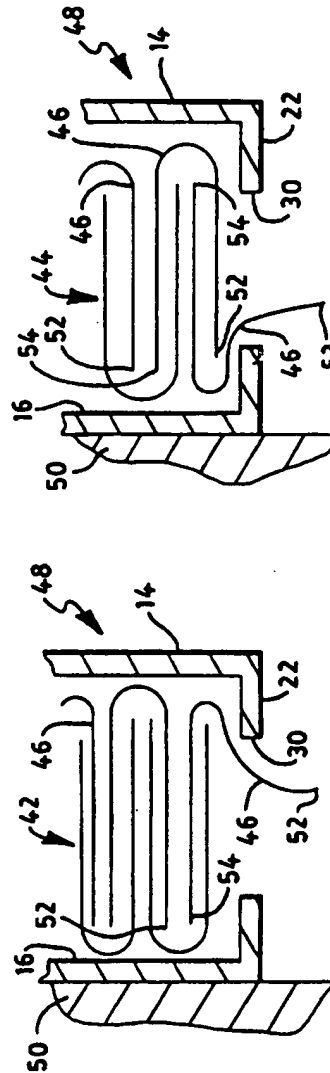


FIG. 4B

FIG. 4A

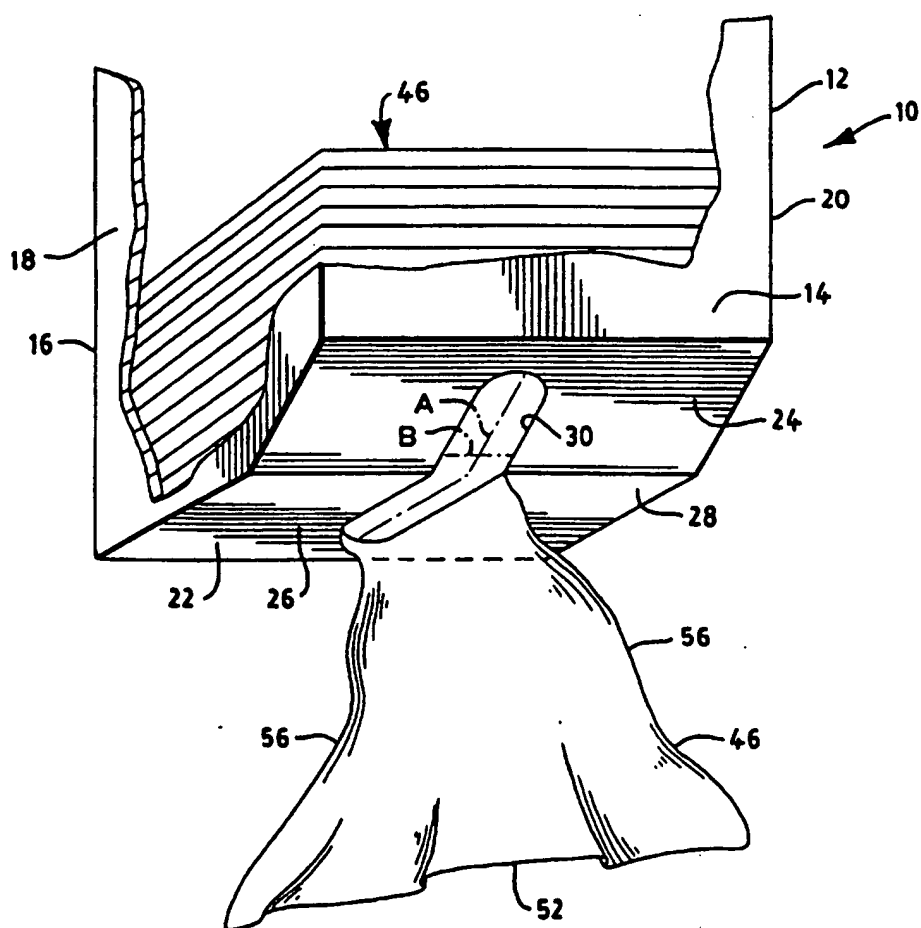


FIG. 5



# INTERNATIONAL SEARCH REPORT

Intern. Application No  
PCT/GB 97/01362

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>IPC 6 A47K10/42   |  |  |
|---|--|--|
| According to International Patent Classification (IPC) or to both national classification and IPC   |  |  |
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>IPC 6 A47K B65D   |  |  |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched   |  |  |
| Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  |  |  |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>   |  |  |
| Category *  | Citation of document, with indication, where appropriate, of the relevant passages                   | Relevant to claim No.  |
| X   | GB 1 112 680 A (ZELLSTOFFFABRIK WALDHOF) 8 May 1968  | 1,4-6,9,11   |
| Y   | see page 3, line 48 - page 4, line 8; figures 1,2  | 2,3,7,8  |
|   | ---  |  |
| X   | US 3 819 043 A (HARRISON) 25 June 1974   | 1,4-6,9-12   |
| Y   | see column 2, line 4 - line 24; figures 1,2  | 2,3,7,8  |
|   | ---  |  |
| A   | US 1 577 094 A (ARMS) 16 March 1926<br>see page 1, line 46 - line 95; figures                        | 1-12   |
|   | ---  |  |
| A   | WO 89 12418 A (KAYSERSBERG SA) 28 December 1989<br>see page 4, line 11 - page 6, line 4; figures 1,2 | 1,2,4-7,9,11   |
|   | ---  |  |
|   | -/--   |  |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.   |  |  |
| * Special categories of cited documents :<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier document but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.<br>"Z" document member of the same patent family |  |  |
| Date of the actual completion of the international search<br><br>4 August 1997  |  | Date of mailing of the international search report<br><br>13. 08. 97 |
| Name and mailing address of the ISA<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax (+ 31-70) 340-3016   |  | Authorized officer<br><br>Porwoll, H                                 |

# INTERNATIONAL SEARCH REPORT

Intern. Application No  
PCT/GB 97/01362

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|------------|---|-----------------------|
| A          | EP 0 331 027 A (NAKAMURA) 6 September 1989<br>see column 12, line 22 - line 44<br>see column 17, line 37 - column 19, line 14; figures 9,18,19<br>--- | 12                    |
| A          | US 2 529 853 A (TAGGART) 14 November 1950<br>---  |                       |
| A          | DE 31 27 358 A (WAGNER) 27 January 1983<br>---  |                       |
| A          | US 1 588 733 A (HOBERG) 15 June 1926<br>---   |                       |
| A          | US 1 724 428 A (SHERMAN) 13 August 1929<br>-----  |                       |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat. J Application No  
PCT/GB 97/01362

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)   | Publication<br>date  |
|---|---------------------|--|--|
| GB 1112680 A                              |                     | BE 683467 A<br>CH 449881 A<br>DE 1289274 B<br>LU 51561 A<br>NL 6609925 A,B   | 01-12-66<br><br>14-09-66<br>18-01-67   |
| US 3819043 A                              | 25-06-74            | NONE   |  |
| US 1577094 A                              | 16-03-26            | NONE   |  |
| WO 8912418 A                              | 28-12-89            | FR 2632844 A<br>EP 0382809 A<br>US 5143249 A<br>US 5265758 A   | 22-12-89<br>22-08-90<br>01-09-92<br>30-11-93   |
| EP 331027 A                               | 06-09-89            | JP 1226579 A<br>JP 6045385 B<br>JP 1267182 A<br>JP 6045382 B<br>AU 3026389 A<br>CA 1307498 A<br>HK 62494 A<br>SG 28694 A<br>US 4848575 A | 11-09-89<br>15-06-94<br>25-10-89<br>15-05-94<br>21-09-89<br>15-09-92<br>01-07-94<br>10-06-94<br>18-07-89 |
| US 2529853 A                              | 14-11-50            | NONE   |  |
| DE 3127358 A                              | 27-01-83            | NONE   |  |
| US 1588733 A                              | 15-06-26            | NONE   |  |
| US 1724428 A                              | 13-08-29            | NONE   |  |